SIEMENS

Fax

To:	Special Programs Examiner **Attn: Examiner Yuen**	**From:**	Vicki Chia
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# Pages:	45 (including cover sheet) total	**Email:**	Vicki.chia@siemens.com
RE:	Recreation of appln. 09/657,635 (attorney docket no. 2000P82261US)		

Message:

There may have been a disruption in the fax transmission causing part of the copies to not have been sent. Attached is the rest and should be 44 pages, in total, including our earlier transmission, 64 pages.

Kind regards,

Vicki Chia

Siemens Corporation

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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/657,635	09/06/2000	Ismayil M. Guracar	2000P82261 US	1723

EXAMINER
JAWORSKI, FRANCIS J

ART UNIT	PAPER NUMBER
3737	

7590 08/12/2002

Elsa Keller
SIEMENS CORPORATION
Intellectual Property Department
186 Wood Avenue South
Iselin, NJ 08830

DATE MAILED: 08/12/2002

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The patent term adjustment to date is 181 days. If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the term adjustment will be 181 days.

If a continued prosecution application (CPA) was filed in the above-identified application, the filing date that determines patent term adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system. (http://pair.uspto.gov)

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UNITED STATES

Notice of Fee Increase on October 1, 2002

If a reply to a "Notice of Allowance and Fee(s) Due" is filed in the Office on or after October 1, 2002, then the amount due may be higher than that set forth in the "Notice of Allowance and Fee(s) Due" since there will be an increase in fees effective on October 1, 2002. See Revision of Patent and Trademark Fees for Fiscal Year 2003; Notice of Proposed Rulemaking, 67 Fed. Reg. 30634, 30636 (May 7, 2002). Although a change to the amount of the publication fee is not currently proposed for October 2002, if the issue fee or publication fee is to be paid on or after October 1, 2002, applicant should check the USPTO web site for the current fees before submitting the payment. The USPTO Internet address for the fee schedule is: http://www.uspto.gov/main/howtofees.htm.

If the issue fee paid is the amount shown on the "Notice of Allowance and Fee(s) Due," but not the correct amount in view of the fee increase, a "Notice to Pay Balance of Issue Fee" will be mailed to applicant. In order to avoid processing delays associated with mailing of a "Notice to Pay Balance of Issue Fee," if the response to the Notice of Allowance and Fee(s) due form is to be filed on or after October 1, 2002 (or mailed with a certificate of mailing on or after October 1, 2002), the issue fee paid should be the fee that is required at the time the fee is paid. If the issue fee was previously paid, and the response to the "Notice of Allowance and Fee(s) Due" includes a request to apply a previously-paid issue fee to the issue fee now due, then the difference between the issue fee amount at the time the response is filed and the previously paid issue fee should be paid. See Manual of Patent Examining Procedure, Section 1308.01 (Eighth Edition, August 2001).

Effective October 1, 2002, 37 CFR 1.18 is proposed to be revised to change the patent issue fees as set forth below. As stated above, the final fees may be a different amount, and applicant should check the web site given above when paying the fee.

(a) Issue fee for issuing each original or reissue patent, except a design or plant patent:

By a small entity (Sec. 1.27(a))--$655.00
By other than a small entity--$1,310.00

(b) Issue fee for issuing a design patent:

By a small entity (Sec. 1.27(a))--$235.00
By other than a small entity--$470.00

(c) Issue fee for issuing a plant patent:

By a small entity (Sec. 1.27(a))--$315.00
By other than a small entity--$630.00

Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

Notice of Allowability	Application No. 09/657,635	Applicant(s) GURACAR ET AL.
	Examiner Jaworski Francis J.	Art Unit 3737

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *amdt 7-23-02*.
2. ☒ The allowed claim(s) is/are *1-16,18-38*.
3. ☐ The drawings filed on _____ are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
   (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

8. ☐ CORRECTED DRAWINGS must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No. _____.
   (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.
   (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the top margin (not the back) of each sheet. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1☐ Notice of References Cited (PTO-892)
2☐ Notice of Informal Patent Application (PTO-152)
3☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
4☐ Interview Summary (PTO-413), Paper No._____.
5☐ Information Disclosure Statements (PTO-1449), Paper No. _____.
6☐ Examiner's Amendment/Comment
7☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
8☐ Examiner's Statement of Reasons for Allowance
9☐ Other

Francis J. Jaworski
Primary Examiner

To the U.S. Patent & Trademark Office
Please stamp the date of receipt of the following document(s) and return this postcard to us.
Atty Dkt.: 2000P82261US Atty.: JGK:HJG/rcw
S/N: 09/657,635 Filed: 08/28/01
Inventor(s): Guracar, et al.
Title: CONTRAST IMAGING BEAM SEQUENCES FOR MEDICAL DIAGNOSTIC ULTRASOUND

X Response and Amendment to Office Action dated May 6, 2002
X Certificate of mailing dated: 7/17/02

Typed Pat 7/17/02

To the U.S. Patent & Trademark Office
Please stamp the date of receipt of the following document(s) and return this postcard to us.
Atty Dkt.: 2000P82261US Atty.: JGK:HJG/rcw
S/N: 09/657,635 Filed: 08/28/01
Inventor(s): Guracar, et al.
Title: CONTRAST IMAGING BEAM SEQUENCES FOR MEDICAL DIAGNOSTIC ULTRASOUND

X Response and Amendment to Office Action dated May 6, 2002
X Certificate of mailing dated: 7/17/02

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on 7/17/02
Date of deposit
By: Raquel C. West

PATENT
CASE NO. 2000P82261US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application:	)	
Guracar et al.	)	Examiner: F. Jaworski
Serial No.: 09/657,635	)	Group: 3737
Filed: August 28, 2001	)	
For: CONTRAST IMAGING BEAM SEQUENCES FOR MEDICAL DIAGNOSTIC ULTRASOUND	)	

RESPONSE AND AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

In response to the Office Action dated May 6, 2002, please enter the following amendment and consider the following remarks:

AMENDMENT

Please rewrite claims 1-11, 21 and 27 as follows:

1. (amended) In a method of transmitting a sequence of transmit pulses for scanning a region of a target including contrast agents, the improvement wherein:

a substantially similar energy sequence is provided for substantially each transmit scan line in the region of at least eight scan lines, where the energy sequence includes at least one collateral energy pulse between two imaging pulses.

2. (amended) The method of Claim 1 responsive to the transmit pulses characterized by a flow sample interleave ratio that is equal to a flow sample count minus one.

3. , (amended) The method of Claim 1 further comprising energy responsive to a destruction pulse where an image is responsive to the energy of the imaging pulses and substantially free of response to the energy of the destruction pulse.

4. (amended) The method of Claim 1 responsive to the transmit pulses characterized by a flow sample interleave ratio that is two and a flow sample count that is three.

5. (amended) The method of Claim 4 comprising e eCeCeCe e where "e" represents a collateral energy pulse and "C" represents an imaging energy pulse.

6. (amended) The method of Claim 1 responsive to the transmit pulses characterized by a flow sample interleave ratio that is three and a flow sample count that is four.

7. (amended) The method of Claim 6 comprising e eC eCeeCe Ce e where "e" represents a collateral energy pulse and "C" represents an imaging energy pulse.

8. (amended) The method of Claim 1 responsive to the transmit pulses characterized by a flow sample interleave ratio that is three and a flow sample count that is three.

9. (amended) The method of Claim 8 comprising e eC eCe Ce e where "e" represents a collateral energy pulse and "C" represents a imaging energy pulse.

10. (amended) The method Claim 1 wherein the flow sample interleave ratio is an integer multiple of one less than a flow sample count.

11. (amended) A method for imaging contrast agents with an ultrasound system, the method comprising the acts of:

(a) generating a substantially similar transmit pulse sequence for substantially each line in a scanned region of at least eight scan lines; and

(b) interleaving collateral pulses from a transmission along a first scan line between at least two imaging pulses along a second different scan line, the transmit pulse sequence including energy from collateral pulses of adjacent scan lines and imaging pulses on each line.

21. (amended) A method for imaging contrast agents with an ultrasound system, the method comprising the acts of:

(a) transmitting a first pulse along a first scan line;

(b) transmitting a second pulse along a second scan line after (a), the second scan line adjacent the first scan line;

(c) transmitting a third pulse along the first scan line after (b); and

(d) repeating (a), (b) and (c) for a different set of scan lines such that a substantially same sequence of collateral and imaging pulses is provided for each of a plurality of scan lines including the scan lines of the different sets.

27. (amended) A method for imaging contrast agents with an ultrasound system, the method comprising:

(a) transmitting pulses with a flow sample interleave ratio greater than one;

(b) generating a substantially similar imaging pulse and collateral pulse energy sequence for substantially each transmit line in a scanned region including at least eight transmit lines; and

(c) sampling energy responsive to each transmitted pulse.

Please cancel claim 17.

REMARKS

The amendments to the rewritten claims are shown in the attached Appendix. In the Appendix, additions are underlined and deletions are indicated with brackets.

In the Office Action, the Examiner rejected claims 1-10 pursuant to 35 U.S.C. §101 as non-statutory subject matter. Claims 11-33 were rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Clark (U.S. Patent No. 5,980,458) in view of Poland (U.S. Patent No. 6,080,107) or over Hwang (U.S. Patent No. 6,193,662) in combination with Averkiou et al. (U.S. Patent No. 6,186,950). Claims 34-38 were rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Averkiou et al. or Hwang et al. (U.S. Patent No. 6,228,031). Applicants respectfully request reconsideration of claims 1-38, including independent claims 1, 11, 21, 27, 29 and 34.

Claims 1-10 have been amended to clarify that the sequence is part of a method of transmitting. Claims 1-10 claim statutory subject matter.

The pulse sequence limitation of some of the independent claims was also amended to more clearly indicate the pulses or energy considered as part of the pulse sequence. These amendments clarify the pulse sequence term already in the claims, so do not narrow the claims. Likewise, the amendments adding at least eight scan lines clarify the meaning of scanned region.

Claim 1 requires a substantially similar energy sequence for each of at least eight scan lines where the energy sequence includes a collateral energy pulse between two imaging pulses. None of the cited references disclose these.

Clark teaches an interleave transmit sequence of A1, B1, C1, A2, B2, C2, A3, B3, C3 and so on (col. 2, lines 35-44) where A, B and C are the scan lines and 1, 2 and 3 are the transmission number along that scan line. Further cited disclosure of Clark does not provide for another specific sequence. Using the sequence of Clark, each scan line A, B and C is subjected to a different energy or pulse sequence. Scan line A receives Ce Ce Ce; scan line B receives eCeeCeeCe and scan line C receives eC eC eC where "C" represents energy from an imaging pulse on the scan line and "e" represents energy from an imaging pulse along an adjacent scan line. Scan line C may receive additional collateral energy depending on the meaning of "and so on." Repeating this interleave sequence for other scan lines (e.g. D, E and F) merely results in continuing to introduce an artifact from differences in energy sequences, so does not result in substantially the same energy or pulse sequence. For example, scan line C would then receive eC eC eCe e e, still different than A and B. Clark does not disclose a substantially similar energy sequence for each of at least eight scan lines where the energy sequence includes a collateral energy pulse between two imaging pulses.

Poland, unlike Clark, discloses contrast agent imaging. Poland does not teach specific transmit sequences, so does not disclose a substantially similar energy sequence for each of at least eight scan lines where the energy sequence includes a collateral energy pulse between two imaging pulses.

Hwang '662 discloses various transmit sequences with a flow sample interleave ratio of one (see Figures 1-4). The pulses for each transmitted scan line are sequentially transmitted before transmitting along another scan line. Multiple receive scan lines are formed for each transmit line. Further sets of information may be formed by interpolating between received scan lines. The Examiner notes that the distinction between interleaved and collateral pulses in relation to scan lines is blurred because the interpolated lines are also referred to as scan lines. However, claim 1 is a sequence of transmit pulses where the energy sequence is for each transmit scan line. Hwang '662 does not suggest a substantially similar energy sequence for

each of at least eight transmit scan lines where the energy sequence includes a collateral energy pulse between two imaging pulses.

The cited disclosure of Averkiou et al. teaches a time interleaved contrast agent imaging transmit sequence (col. 7, lines 6-32). Transmit pulses along four adjacent scan lines are fired. This sequence is then repeated once or twice more for the same four scan lines using any of various phasing of the transmit waveforms. If the same sequence is then repeated for transmit scan lines 5-8, 9-12 . . ., the imaging and collateral energy sequence varies between transmit scan lines. Averkiou et al. do not teach repetition or how to repeat the sequence across the region. Averkiou et al. do not teach how to scan an entire region or more than four scan lines, so Averkiou et al. do not suggest a substantially similar energy sequence for each of at least eight transmit scan lines where the energy sequence includes a collateral energy pulse and imaging pulses.

Claim 11, like claim 1, requires generating a substantially similar transmit pulse sequence for substantially each line in a scanned region of at least eight scan lines where the transmit pulse sequence includes energy from collateral pulses and imaging pulses on each line. As discussed above, none of the cited references disclose this limitation.

Claim 21, similar to claim 11, requires repeating three transmissions along two scan lines for different sets of scan lines such that a substantially same sequence of collateral and imaging pulses is provided for each of the scan lines. Clark and Averkiou et al. teach a single sequence for multiple lines, but do not disclose repeating the sequence for other lines where the sequence is substantially the same for each of the scan lines in both different sets. If merely repeated for different sets, then the sequences of both Clark and Averkiou et al. provided for different collateral and imaging pulse sequences for different scan lines. As previously discussed with respect to claim 1, Poland does not suggest specific transmit sequences. Hwang '662 discloses in the Figures transmitting without interleaving, so does not suggest the claimed transmission sequence.

Claim 27 requires using a flow sample interleave ratio greater than one for generating a substantially similar imaging pulse and collateral pulse energy sequence for substantially each transmit line in a scanned region including at least eight scan lines. Clark provides different imaging and collateral pulse energy sequences for different transmit lines. Poland does not suggest specific transmit sequences. Hwang '662 does not suggest a flow sample interleave ratio greater than one for transmit scan lines. Averkiou et al. do not provide a substantially similar imaging pulse and collateral pulse energy sequence for each transmit line in a region including at least eight scan lines.

The dependent claims 2-10, 12-16, 18-20, 22-26 and 28 depend from the independent claims discussed above. Accordingly, these dependent claims are allowable for the reasons discussed above for the independent claims. Further limitations of the dependent claims distinguish these claims from the cited references. For example, none of the references disclose: a flow sample interleave ratio that is equal to an integer multiple of a flow sample count minus one as claimed in claims 2, 10, 12, 18, 22, 26 and 28; or the specific combinations of flow sample interleave ratio and flow sample count as claimed in claims 4-9, 14-16 and 23-25.

Claim 29 requires replacing signals of one scan line with signals of another scan line based on a comparison of an intensity with a value. The cited disclosure of Clark discloses parallel artifacts, but suggests filtering and transmit changes to generate images without these parallel artifacts (col. 4, line 10-col. 6, line 9). Clark contemplates application to an entire image, so does not suggest comparison and replacement based on the comparison.

Poland determines a concentration of contrast agent and adjustment of characteristics of the acoustic imaging signals based on the concentration (col. 4, lines 6-15). For example, the receive signal amplitude is reduced or the transmit power is changed (col. 4, lines 15-24). Depletion transmissions may be used to control the concentration of contrast agent (col. 5, line 63-col. 6, line 29). Poland does not suggest replacing signals of one scan line with signals of another scan line based on a comparison.

Hwang '662 discloses pulse inversion scanning (col. 2, lines 33-40). Data for different receive scan lines of opposite phase are combined (col. 3, lines 4-16). For interpolated lines, axial re-sampling or filtering is used to remove an artifact (col. 6, lines 19-55). In one embodiment, multi-line interpolation motion artifact is avoided by using a transmit sequence (col. 10, lines 13-28). The Examiner does not cite to disclosure by Hwang '662 of any replacement of data based on a comparison.

Averkiou et al. disclose a motion artifact resulting from using two transmissions to a same area (col. 3, lines 1-48). To address this motion artifact, Averkiou et al. transmit at least one further pulse (col. 3, lines 49-56). The signals responsive to the three pulses are then combined for imaging (col. 4, lines 8-28). Averkiou et al. use three or more transmissions for reducing the motion artifact, so do not suggest replacing signals of one scan line based on a comparison. Furthermore, a user of the system in a two pulse mode would not compare the intensities to a value in order to switch to the three pulse mode. Averkiou et al. do not suggest the limitations of claim 29.

Claim 34, similar to claim 29, requires identifying signals associated with an image artifact and replacing the signals as a function of signals responsive to contrast agents. As discussed above, Averkiou et al. use a specific process to avoid artifacts, so do not suggest replacing signals associated with artifacts. Where a user switches between modes, signals are not replaced. Instead, different imaging is performed.

Hwang et al. '031 disclose avoiding a picket fence artifact by filtering or averaging received scan line data (col. 4, lines 41-54). The system does not identify an artifact and then replace signals. A user switching between modes due to viewing an artifact does not cause replacement of signals, but merely sets up different imaging.

CONCLUSION:

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call Henry Groth at (650) 943-7350 or Craig Summerfield at (312) 321-4726.

Respectfully submitted,

Jenny Ko Reg. No. 44,190
ON BEHALF OF
Henry J. Groth Reg. No. 39,696
Attorney for Applicants

Siemens Corporation
Intellectual Property Department
186 Wood Avenue South
Iselin, N.J. 08830

Dated: July 17, 2002

APPENDIX

1. (amended) In a method of transmitting a sequence of transmit pulses for scanning a region of a target including contrast agents, the improvement wherein:

a substantially similar energy sequence is provided for substantially each transmit scan line in the region of at least eight scan lines, where the energy sequence includes at least one collateral energy pulse between two imaging pulses.

2. (amended) The [sequence] method of Claim 1 responsive to the transmit pulses characterized by a flow sample interleave ratio that is equal to a flow sample count minus one.

3. (amended) The [sequence] method of Claim 1 further comprising energy responsive to a destruction pulse where an image is responsive to the energy of the imaging pulses and substantially free of response to the energy of the destruction pulse.

4. (amended) The [sequence] method of Claim 1 responsive to the transmit pulses characterized by a flow sample interleave ratio that is two and a flow sample count that is three.

5. (amended) The [sequence] method of Claim 4 comprising e eCeCeCe e where "e" represents a collateral energy pulse and "C" represents an imaging energy pulse.

6. (amended) The [sequence] method of Claim 1 responsive to the transmit pulses characterized by a flow sample interleave ratio that is three and a flow sample count that is four.

7. (amended) The [sequence] method of Claim 6 comprising e eC eCeeCe Ce e where "e" represents a collateral energy pulse and "C" represents an imaging energy pulse.

8. (amended) The [sequence] method of Claim 1 responsive to the transmit pulses characterized by a flow sample interleave ratio that is three and a flow sample count that is three.

9. (amended) The [sequence] method of Claim 8 comprising e eC eCe Ce e where "e" represents a collateral energy pulse and "C" represents a imaging energy pulse.

10. (amended) The [sequence] method Claim 1 wherein the flow sample interleave ratio is an integer multiple of one less than a flow sample count.

11. (amended) A method for imaging contrast agents with an ultrasound system, the method comprising the acts of:

(a) generating a substantially similar transmit pulse sequence for substantially each line in a scanned region of at least eight scan lines; and

(b) interleaving collateral pulses from a transmission along a first scan line between at least two imaging pulses along a second different scan line, the transmit pulse sequence including energy from collateral pulses of adjacent scan lines and imaging pulses on each line.

21. (amended) A method for imaging contrast agents with an ultrasound system, the method comprising the acts of:

(a) transmitting a first pulse along a first scan line;

(b) transmitting a second pulse along a second scan line after (a), the second scan line adjacent the first scan line;

(c) transmitting a third pulse along the first scan line after (b); and

(d) repeating (a), (b) and (c) for a different set of scan lines such that a substantially same sequence of collateral and imaging pulses is provided for each of a plurality of scan lines including the scan lines of the different sets.

27. (amended) A method for imaging contrast agents with an ultrasound system, the method comprising:

(a) transmitting pulses with a flow sample interleave ratio greater than one;

(b) generating a substantially similar imaging pulse and collateral pulse energy sequence for substantially each transmit line in a scanned region including at least eight transmit lines; and

(c) sampling energy responsive to each transmitted pulse.